Claims

What is claimed is:

1. An apparatus for projecting fringes onto a surface of an object, said apparatus comprising:

    a) two sources of radiation having a spectral distribution;

    b) a collimator in optical communication with said two sources, said collimator generating two substantially collimated beams of broadband radiation;

    c) a diffractive grating in optical communication with said collimator; and

    d) a lens in optical communication with said diffractive grating, wherein said lens generates two images of radiation having a spatial distribution of spectral regions.

2. The apparatus of claim 1 wherein each of said spectral regions of one of said sources is separated from a respective spectral region of the other of said sources by a distance proportional to the respective wavelength of said spectral regions.

3. The apparatus of claim 2 wherein said distance is linearly proportional to said wavelength of said spectral regions.

4. The apparatus of claim 2 wherein said distance comprises a midpoint equidistant from each of two respective spectral regions and wherein said midpoint is fixed.

5. The apparatus of claim 1 wherein said two sources of radiation are coherent with respect to one another.

6. The apparatus of claim 1 wherein said two sources of radiation have a spectral distribution that is narrowband.

7. The apparatus of claim 1 further comprising a detector for determining three-dimensional position information of a point on said surface of said object.

8. The apparatus of claim 1 wherein the two sources of radiation are generated from a single source of radiation.

9. The apparatus of claim 1 further comprising a translator coupled to said diffractive grating, said translator shifting the relative phase of one of said spectral regions with respect to the other of said spectral regions.

10. A method for mitigating the effects of speckle on a measurement of a point on a surface of an object, said method comprising the steps of:

    a) generating a coherent fringe pattern;

    b) projecting the coherent fringe pattern along an optical path onto the surface of the object such that the fringe pattern substantially grazes the surface of the object; and

    c) detecting the fringe pattern and the speckle in an image of the surface of the object, wherein a normal to the surface of the object is substantially orthogonal to said optical path.

11. The method of claim 10 wherein the coherent fringe pattern substantially grazes the surface of the object at an angle between 0 and 45 degrees with respect to the surface of the object.

12. The method of claim 10 further comprising the step of providing two sources of radiation.

13. The method of claim 12 wherein the two sources are positioned above the surface of the object.

14. The method of claim 12 wherein the two sources are substantially vertically aligned along the normal to the surface of the object.

15. The method of claim 10 wherein the fringe pattern is generated by two sources.

16. The method of claim 15 wherein the two sources are coherent with respect to one another.

17. The method of claim 15 wherein the two sources are laser sources.

18. The method of claim 15 wherein the two sources are generated by splitting a single source.

19. A method for projecting fringes onto a surface of an object, said method comprising the steps of:

a) providing two sources of radiation separated by a distance, each of said sources having a spectral distribution and being coherent with respect to the other of said sources;

b) illuminating said point on said surface of said object with said radiation from each of said sources;

c) moving one of said sources relative to the other of said sources; and

d) detecting radiation scattered by said point on said surface of said object.

20. The method of claim 19 further comprising the step of changing the phase of a spectral component in said spectral distribution from one of said sources relative to the phase of a respective spectral component in said spectral distribution from the other of said sources as measured at said point on said surface of said object.